

Z 6157

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Elective

Engineering Design

ED 1728 — DESIGN OF MATERIAL HANDLING EQUIPMENTS

(Common to M.E.—CAD/CAM Engineering)

(Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

Use of Approved Data Book permitted.

Assume and specify any required relevant data.

PART A — (10 × 2 = 20 marks)

Briefly mention any four types of material handling equipments.

How the motor ratings of a hoist is decided?

Mention the uses of lifting magnets.

Explain the uses of travelling gear mechanism in a crane.

What are the functions of the cog wheel drive?

What are the uses of the apron conveyor?

What are the limitations of the screw conveyor?

What is a pneumatic conveyor?

What are form lift trucks? Mention their applications.

10. Name the safety devices used in elevators.

11. (a) Explain with neat sketches the different types of slewing mechanisms that are adopted in jib cranes. (16)

Or

- (b) Bring out in detail, the factors to be considered in the design of pivot bearings used to support the turn table of pillar type cranes.
12. (a) Design a double shoe spring operated holding brake for a hoisting mechanisms of a 10T travelling crane with a lifting speed of 25 m/min. The crane operates on heavy duty with 130 braking operations per hour. The efficiency of the hoisting mechanism shall be taken as 0.8. The motor speed is 570 rpm.

Or

- (b) Select a suitable wire rope, a set of pulleys and the rope drum required for an electric overhead crane with a lifting magnet for the following data :
- Lifting capacity = 50 kN; Lifting height = 6 meters; Weight of lifting magnet = 20 kN; Number of rope parts = 4; Service duty: Medium.

13. (a) (i) Discuss the factors that contribute to the stability of revolving travelling cranes and the procedure adopted for the selection of the counter weights. (8)
- (ii) Sketch the crane post of a revolving crane and analyze the forces that are acting on it. Explain in detail, how the tail piece assembly of the crane post is designed. (8)

Or

- (b) (i) Sketch a crane hook and explain the factors that influence its design. (8)
- (ii) Sketch and explain the different types of grabs used in material handling equipments. (8)

- (a) Design a belt conveyor to handle 30 tonnes per hour of sulphur powder weighing 1 kg/m^3 . The width of conveyor is 0.8 m while its length is 9 m. The conveyor speed is 20 m/minute and the rise is 2.4 m. Select the belt, pulleys and idlers and prepare a sketch.

Or

- (b) Sketch a vibrating conveyor and explain in detail how a material is moved at a specified frequency. Also explain the design features of the salient parts.
- (a) Design a continuous bucket elevator assembly to lift 25 tonnes of abrasive material weighing 0.6 kg/m^3 at 30 m/min to a vertical height of 30 m.

Or

- (b) (i) Discuss the safety devices that are used in cage elevators. (8)
- (ii) Discuss the different types of loading arrangements used in the bucket elevators. (8)